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(54) Title: ADVERTISING SYSTEM		
(57) Abstract		
In one form, the invention is directed to the combination of a moving vehicle (32) having a passenger compartment, a first seat (17) in the passenger compartment in which a passenger can be seated to normally face in a forward direction a first wall (34) in the passenger compartment situated forwardly of the first seat, a sheet (14) having oppositely facing first and second surfaces with an advertisement (12) on the first surface and an adhesive (42) on the second surface to releasably mount the seat to the first wall in a display position and a tray table assembly (18) mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein at least a part of the tray table assembly is repositioned to allow viewing of more of the advertising by a passenger seat in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position.		<img alt="Diagram of the advertising system. It shows a moving vehicle (32) with a passenger compartment containing a first seat (17). The seat is mounted to a first wall (34) using a sheet (14) with an advertisement (12) on its first surface and adhesive (42) on its second surface. A tray table assembly (18) is mounted on the moving vehicle, guided by tracks (24) and supports (26, 20, 22). The assembly can be moved between a first position where it blocks the view of the advertisement and a second position where it allows more viewing. Reference numerals include 9, 16, 28, 36, 38, 40, 41, 44, 10, 12, 14, 17, 18, 24, 26, 28, 32, 34, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 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ADVERTISING SYSTEM

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

This invention relates to advertising and, more particularly, to an advertising system which can be incorporated into a seat on a vehicle used for mass transportation.

BACKGROUND ART

Vehicles used in mass transportation offer an inviting target for advertisers. For example, a single bus or subway car may be occupied by thousands of different riders each day, thereby resulting in tremendous exposure to an advertisement therewithin. As a result, these vehicles are commonly seen peppered with advertising.

Airplanes used in mass transportation offer, in certain respects, an even better opportunity for advertising in that not only is there a high volume exposure but there is also often an extended exposure time on lengthy routes. However, due principally to considerations unique to the airline industry, exposed advertising has not found its way into passenger compartments on airliners.

Among these considerations are the often unsightly nature of advertisements. The airline industry has shied away from allowing advertisements to appear other than out of view in seat back pockets to thereby maintain a more formal atmosphere within the passenger compartment.

Safety and efficiency considerations have also caused the airlines to reject exposed advertising in passenger compartments. Exposed advertising is intended to be eye catching. Viewing of different advertisements by passengers could contribute to the disruption of traffic flow within the tight quarters of the passenger compartment. Persons viewing advertising throughout the passenger compartment could cause a delay in passenger loading and unloading. Given the importance of

timely arrivals and departures in the highly competitive airline industry, avoidance of passenger flow disruption in the passenger compartment is a significant goal of all airlines. In a worse case, the flow disruption could raise safety concerns.

The seats in airliners could be modified to accept advertising which is visible only from adjacent seats. While this type of advertising may be less intrusive, it still might become unsightly and detract from the atmosphere the airlines have striven to maintain within the passenger compartment. Still further, modification to the seats could introduce safety compliance problems. Additionally, modification to seat backs, such as with the structure shown in U.S. Patent No. 5,010,668, requires a significant investment and potentially an increase in the weight of the seats, resulting in greater fuel consumption for the airplane.

Unfortunately, because of the above problems, advertisers have been unable to take advantage of the high volume, and captive, audience within airliners. A practical form of advertising in airliners could be lucrative not only to the advertisers but to the airlines that could reap a substantial profit by selling advertising space within their airliners.

SUMMARY OF THE INVENTION

In one form, the invention is directed to the combination of a moving vehicle having a passenger compartment, a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction, a first wall in the passenger compartment situated forwardly of the first seat, a surface on the first wall and facing rearwardly toward the first seat, a sheet having oppositely facing first and second surfaces with an advertisement on the first surface and an adhesive on the second surface to releasably mount the sheet to the first wall in a display position, and a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in

the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position.

The first wall may be defined by a second seat situated forwardly of the first seat.

The second seat may have a back wall surface with the surface on the first wall being recessed forwardly of the back wall surface.

The sheet may be removably attached to the first wall by a press fit step.

The surface of the first wall may be a cloth material.

In one form, the first wall has a shape as viewed from the rear of the first wall and the sheet has a shape that is complementary to the shape of the first wall.

The shape of the sheet may substantially fully conform to the shape of the first wall.

In one form, the at least part of the tray table assembly has a wall with oppositely facing surfaces. With the tray table assembly in the first position, one of the oppositely facing surfaces substantially fully blocks the advertisement. With the tray table assembly in the second position, the other of the oppositely facing surfaces faces upwardly to provide a support for objects accessible to a passenger seated in the first seat.

The sheet may be one of paper, cardboard, and plastic.

The advertisement may be at least one of a) a picture, b) a drawing, c) a logo, and d) at least one written word.

The advertisement may direct a viewer thereof to an object within the moving vehicle.

The moving vehicle may be an airplane.

In one form, the adhesive is a pressure sensitive adhesive.

In one form, the sheet is maintained in the display position solely by the adhesive.

The adhesive may be separable from the first wall without leaving any residue on the first wall.

The adhesive may substantially fully cover the second surface.

The invention is also directed to the combination of: a moving vehicle having a passenger compartment; a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction; a first wall in the passenger compartment situated forwardly of the first seat; a surface on the first wall and facing rearwardly toward the first seat; a sheet on the first wall having an advertisement thereon; and a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position. The sheet with the advertisement thereon is removably attached to the first wall by press fitting the sheet to the first wall by movement of the sheet forwardly toward the first wall.

The invention is also directed to the combination of: a moving vehicle having a passenger compartment; a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction; a first wall in the passenger compartment situated forwardly of the first seat; a surface on the first wall and facing rearwardly toward the first seat; a sheet on the first wall having an advertisement thereon; and a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position. The sheet with the advertisement thereon is removably attached to the first wall in a display position by press fitting the sheet to the first wall by movement of the sheet forwardly toward the first wall to cause the fastener to releasably maintain the sheet in the display position. The sheet is maintained in the display position solely by the fastener, whereby the

sheet can be separated from the first wall by drawing the sheet rearwardly with a sufficient force to cause the fastener to release and be separated with the sheet from the first wall. The sheet is directly exposed to a passenger seated in the first seat with the tray table assembly in the second position.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a fragmentary, side elevation view of an airliner with a portion of the fuselage broken away to show a passenger compartment with an advertising system, according to the present invention, incorporated therein;

Fig. 2 is an enlarged, fragmentary, perspective view of one of the seats in the passenger compartment with the inventive advertising system incorporated therein and with a tray table assembly in a first position wherein an advertisement on the inventive system can be readily viewed from the rear of the seat;

Fig. 3 is a rear elevation view of the seat in Fig. 2 with the tray table assembly in a second position wherein the tray table assembly blocks viewing of the advertisement from the rear of the seat;

Fig. 4 is an enlarged, exploded view of an advertisement with one type of fastener system for maintaining the advertisement in a display position, according to the present invention;

Fig. 5 is a view as in Fig. 4 of a modified form of fastener system, according to the present invention;

Fig. 6 is a view as in Fig. 4 showing another modified form of fastener system, according to the present invention;

Fig. 7 is a view as in Fig. 4 showing a further modified form of fastener system, according to the present invention;

Fig. 8 is a view as in Fig. 4 showing a still further modified form of fastener system, according to the present invention;

Fig. 9 is an enlarged, cross-sectional view of a part of the fastener system taken along line 9-9 of Fig. 2;

Fig. 10 is a view as in Fig. 9 of a modified form of fastener system, according to the present invention;

Fig. 11 is a front elevation view of an advertisement with a modified form of fastener system, according to the present invention;

Fig. 12 is a side elevation view of the advertisement and fastener system in Fig. 11;

Fig. 13 is a rear elevation view of the advertisement and fastener system of Figs. 11 and 12; and

Fig. 14 is a rear elevation view of an advertisement with a still further modified form of fastener system, according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring initially to Figs. 1-3, an advertising system, according to the present invention, is shown at 10. The advertising system 10 consists of an advertisement 12 which is provided on a sheet 14, that is preferably a thin layer of paper, cardboard, plastic, or the like. The advertisement 12 may take the form of any conventional advertising, which is typically in the nature of a picture, a drawing, a logo, and a written word(s).

The advertisement 12 is mounted in a display position, as shown in Figs. 2 and 3, within a recess 16 on a seat 17, which recess 16 is configured to accept a tray table assembly 18. The tray table assembly 18 consists of a wall 20 which nests closely within the recess 16 with the tray table assembly 18 in a first position as shown in Fig. 3, wherein a surface 22 on the wall 20 substantially fully blocks the advertisement 12 as viewed from the rear of the seat 17. Through a linkage 24, the tray table assembly 18 is allowed to reposition from the Fig. 3 position to a second position, as shown in Fig. 2, wherein a surface 26, facing oppositely to the surface 22, faces upwardly to provide a support for objects accessible to a passenger seated behind the seat 17. A repositionable catch 28 maintains the tray table assembly 18 in the Fig. 3 position.

Four seats A, B, C, D are shown in a passenger compartment 30 on a moving vehicle/airplane 32 in Fig. 1. The advertisement 12 on the back of the seat A is viewable by a passenger sitting normally and facing forwardly in seat B, with the advertisement 12 on the seat B being viewable by a passenger sitting in seat C, and so on. For a passenger sitting in seat A, the advertising system 10 can be provided on a dividing wall 34 within the passenger compartment 30. The advertising system 10 on the wall 34 functions in exactly the same manner as if it had been mounted on a seat forwardly of the seat A.

Exemplary seat A has a back wall 36 with a rearwardly facing surface 38. A rearwardly facing wall surface 40 is recessed forwardly from the back wall surface 36 and defines a support for the advertising sheet 14. In conventional seat construction, a cloth layer 41 defines both the back wall surface 38 and the wall surface 40.

In one form of the invention, as shown in Fig. 10, the sheet 14 is provided with a hook and loop-type fastener element 42. In this case, the fastener element 42 has hooks thereon which allow the fastener element 42 to directly adhere to the cloth layer 41 defining the surface 40. Accordingly, the sheet 14 can be placed in the display position of Figs. 2 and 3 by a simple press fit step without any modification to the seat A.

The fastener element 42 can be suitably secured to the sheet 14 as by an adhesive or by sewing. In one preferred arrangement, shown in Figs. 2, 3, and 6, two laterally spaced, vertically extending strips 44 of a fastener element 42 are applied to the sheet 14. This produces a stable mounting for the sheet 14, while facilitating its separation from the wall surface 40 when the sheet 14 is to be removed or replaced.

In Fig. 9, a modified form of fastener system, according to the invention, is shown wherein a fastener element 46 is fixed to the cloth surface 40. In this case, the fastener element 46 has a loop configuration. The cooperating hook and loop fastener elements 42, 46 generally produce a more positive adhesion between the sheet 14 and the surface 40 than the hook fastener element 42 can directly with the cloth layer 41.

Figs. 4, 5, 7 and 8 show alternative fastener system arrangements, according to the present invention. In Fig. 4, the sheet 14 has horizontally extending hook fastener elements 48 which cooperate with complementary loop fastener elements 50 on the surface 40. In Fig. 5, four squares of hook fastener element 52 are mounted to the sheet 14 to cooperate with loop fastener elements 54 on the surface 40. In Fig. 7, a single, circular pad 56 of hook fastener element is attached to the sheet 14 to cooperate with a complementary loop fastener element 58 on the surface 40. In Fig. 8, a single strip 60 of hook fastener element is attached to the sheet 14 to cooperate with a complementary loop fastener element 62 on the surface 40.

It should be understood that, in each embodiment, the loop fastener elements 50, 54, 58 and 62 could be eliminated. Alternatively, the hook fastener elements 44, 48, 52, 56, 60 could be provided on the surface 40 with the complementary loop fastener elements 46, 50, 54, 58, 62 being provided on the sheet 14.

It should also be understood that while the recess 16 is shown in one exemplary seat construction, some airliners use seats with a flat back wall 36 without any recess therein. The tray table assembly 18 functions in exactly the same manner and selectively blocks and exposes the advertisement 12, according to the present invention, in the same manner, as described above.

In Figs. 2 and 3, the advertisement 12 is shown to have a rectangular shape that is complementary to the rectangular shape of the recess 16. To maximize the visual effect, a sheet 12', as shown in dotted lines in Fig. 2, can be made to fully conform to the recess 16.

In another aspect to the invention, the advertisement 12, as seen in Fig. 3, can refer the passenger to another object in the passenger compartment 30. In one embodiment, the seat A has a pocket 64 on the back wall 36 thereof. Within the pocket, an object 66 is placed. The advertisement 12 on the sheet 14 directs the viewer thereof to the object 66.

As one example, the advertisement 12 might direct the user to obtain a coupon from the object 66. Alternatively, the advertisement 12 might refer a passenger to flight information or other information of interest to the passenger.

With the inventive system, the sheet 14 can be placed so that it is fully blocked with the tray table assemblies 18 in the first, closed position. As passengers enter and exit the passenger compartment 30, the advertisements 12 are fully obscured so that the passenger compartment has a normal appearance.

The advertising system 10 can be constructed so that maintenance crews can simply pull off sheets 14 and effect replacement thereon in a relatively simple operation.

In Figs. 11-13, an advertisement 12 is shown on the sheet 14 with a modified form of fastener system, according to the present invention, at 102. The fastener system 102 consists of a fastener in the form of a pressure sensitive adhesive layer 104, which in the embodiment in Figs. 11-13, is applied to cover the entire forwardly facing surface 106 of the sheet 14. A removable, split, backing paper layer 108 can be provided over the adhesive layer 104 to protect the adhesive layer 104 and prevent adherence thereto of foreign material prior to use.

The sheet 14 in Figs. 11-13 carries the same type of advertisement 12, has the same shape, and is capable of being applied in the same manner as the sheet 14 in Figs. 1-10.

When the user desires to effect mounting of the sheet 14, sections 110, 112 of the backing paper layer 108, separated by a cut line 114, can be peeled from the adhesive layer 104 to expose the adhesive layer 104. The sheet 14 can then be pressed against the desired mounting location, as previously described, to be releasably held thereagainst by the adhesive layer 104.

With this arrangement, the sheet 14 can be assembled by a simple press fit step, as with the hook and loop-type fastener, previously described. No modification to the existing mounting surface need be made to allow the adhesive layer 104 to be held thereagainst. When it is desired to change, or remove, the advertising, the sheet 14 can be drawn in a direction oppositely to the assembly

direction so that the sheet 14 and adhesive layer 104 separate together from the mounting surface.

In a preferred form, the adhesive layer 104 is defined by #88 Brenner adhesive. Other adhesives are contemplated which can positively hold the sheet 14 in the display position on the mounting surface while allowing full separation of the sheet 14 from the mounting surface without leaving any significant amount of adhesive residue or marring the mounting surface. Ideally, the adhesive is of a nature that allows it to be re-used. That is, ideally, the sheet 14 can be separated from the display position and re-mounted in the display position on the same, or a different, mounting surface.

The sheet 14 can have the construction previously described, i.e., it may be made from paper, cardboard, plastic, or the like. Vinyl is particularly suitable for this purpose.

In Fig. 14, a further modification is shown wherein the adhesive layer 116, corresponding to the adhesive layer 104, is applied at strategic locations on the surface 106. In this case, the adhesive layer 116 forms a border 118 around the peripheral edge 120 of the sheet 14.

A discrete amount of adhesive 122 may be applied within the border 118. Virtually any pattern of the adhesive layer 116 can be employed, depending upon the nature of the surface to which the sheet 14 is to be attached, and the required holding strength.

Preferably, in the airplane environment, the sheet is maintained in the display position solely by the adhesive and is directly exposed to a passenger seated therebehind. Assembly and disassembly thus involves simple forward and rearward movement of the sheet 14, without the need for separate fasteners.

The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

CLAIMS

1. In combination:

a moving vehicle having a passenger compartment;

a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction;

a first wall in the passenger compartment situated forwardly of the first seat;

a surface on the first wall and facing rearwardly toward the first seat;

a sheet having oppositely facing first and second surfaces, there being an advertisement on the first surface and an adhesive on the second surface to releasably mount the sheet to the first wall in a display position; and

a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position.

2. The combination according to claim 1 wherein the first wall is defined by a second seat situated forwardly of the first seat.

3. The combination according to claim 2 wherein the second seat has a back wall surface and the surface on the first wall is recessed forwardly of the back wall surface.

4. The combination according to claim 1 wherein the sheet is removably attached to the first wall by a press fit step.

5. The combination according to claim 1 wherein the surface of the first wall comprises a cloth material.

6. The combination according to claim 3 wherein the first wall has a shape as viewed from the rear of the first wall and the sheet has a shape that is complementary to the shape of the first wall.

7. The combination according to claim 5 wherein the shape of the sheet substantially fully conforms to the shape of the first wall.

8. The combination according to claim 3 wherein the at least part of the tray table assembly comprises a wall with oppositely facing surfaces, with the tray table assembly in the first position one of the oppositely facing surfaces substantially fully blocks the advertisement, and with the tray table assembly in the second position the other of the oppositely facing surfaces faces upwardly to provide a support for objects accessible to a passenger seated in the first seat.

9. The combination according to claim 1 wherein the sheet comprises one of paper, cardboard, and plastic.

10. The combination according to claim 1 wherein the advertisement comprises at least one of a) a picture, b) a drawing, c) a logo, and d) at least one written word.

11. The combination according to claim 1 wherein the advertisement directs a viewer thereof to an object within the moving vehicle.

12. The combination according to claim 1 wherein the moving vehicle comprises an airplane.

13. The combination according to claim 1 wherein the adhesive is a pressure sensitive adhesive.

14. The combination according to claim 1 wherein the sheet is maintained in the display position solely by the adhesive.

15. The combination according to claim 1 wherein the adhesive is separable from the first wall without leaving any residue on the first wall.

16. The combination according to claim 1 wherein the adhesive substantially fully covers the second surface.

17. A method of placing and removing an advertisement in a moving vehicle having a passenger compartment, a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction, a first wall situated forwardly of the first and having a surface facing rearwardly toward the first seat, and a tray table assembly mounted on the moving vehicle for movement between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position, said method comprising the steps of:

providing a sheet having first and second oppositely facing surfaces with their being an advertisement in the first surface and a fastener on the second surface,

directing the sheet forwardly to thereby cause the fastener to engage the rearwardly facing surface on the first wall so that the fastener itself maintains the sheet in a display position wherein the advertisement is directly exposed to a passenger seated in the first seat; and

removing the sheet from the display position by grasping and drawing the sheet in a rearward direction to cause the sheet to separate together with the fastener from the rearwardly facing surface on the first wall.

18. In combination:

a moving vehicle having a passenger compartment;

a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction;

a first wall in the passenger compartment situated forwardly of the first seat;

a surface on the first wall and facing rearwardly toward the first seat;

a sheet on the first wall, the sheet having an advertisement thereon; and

a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position,

wherein the surface on the first wall comprises a cloth material and the sheet has a fastener thereon that is removably attached directly to the cloth material without fixing any type of fastener to the cloth material;

wherein the fastener has hooks thereon which directly adhere to the cloth material.

19. In combination:

a moving vehicle having a passenger compartment;

a first seat in the passenger compartment in which a passenger can be seated to normally face in a forward direction;

a first wall in the passenger compartment situated forwardly of the first seat;

a surface on the first wall and facing rearwardly toward the first seat;

a sheet on the first wall, the sheet having an advertisement thereon; and

a tray table assembly mounted on the moving vehicle for guided movement relative to the moving vehicle between a) a first position wherein at least a part of the tray table assembly blocks viewing of the advertisement by a passenger seated in the first seat and b) a second position wherein the at least part of the tray table assembly is repositioned to allow viewing of more of the advertisement by a passenger seated in the first seat than can be viewed by a passenger seated in the first seat with the tray table assembly in the first position,

wherein the sheet with the advertisement thereon is removably attached to the first wall in a display position by press fitting the sheet to the first wall by movement of the sheet forwardly toward the first wall to cause the fastener to releasably maintain the sheet in the display position,

wherein the sheet is maintained in the display position solely by the fastener, whereby the sheet can be separated from the first wall by drawing the sheet rearwardly with a sufficient force to cause the fastener to release and be separated with the sheet from the first wall,

the sheet being directly exposed to a passenger seated in the first seat with the tray table assembly in the second position.

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Fig. 1

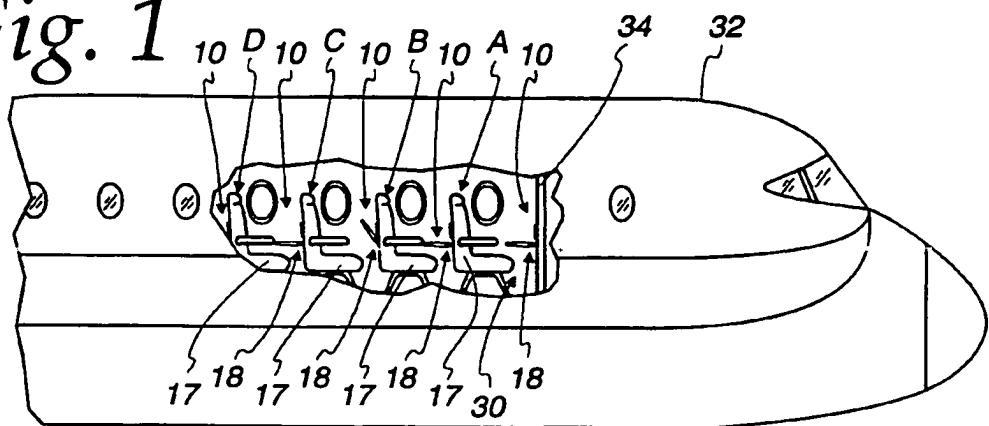
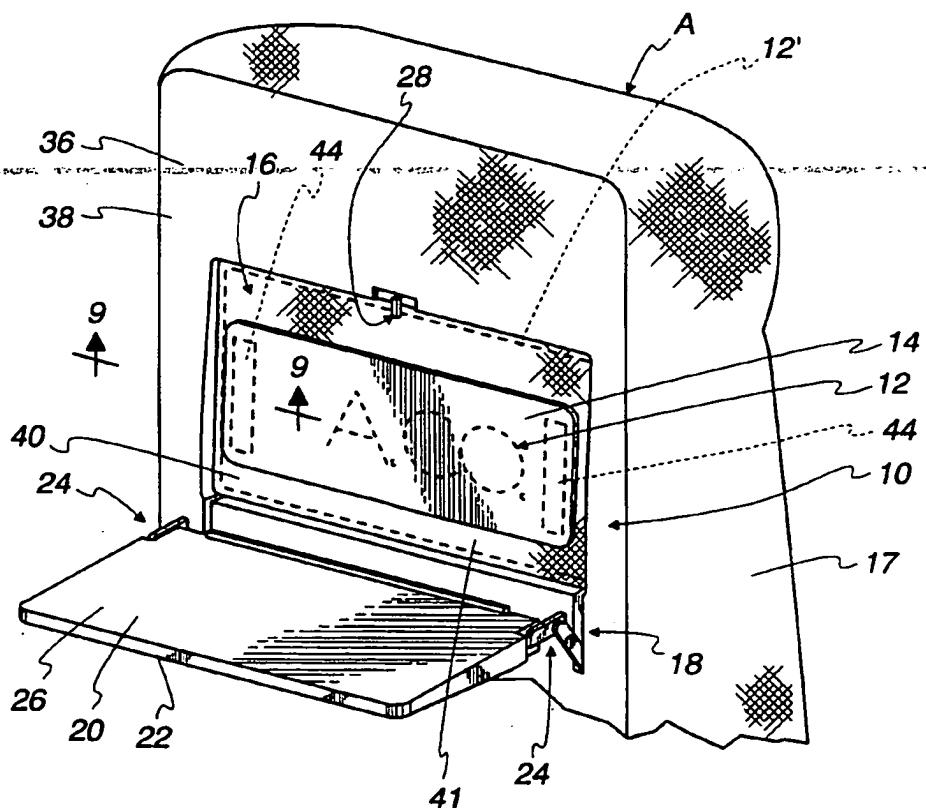


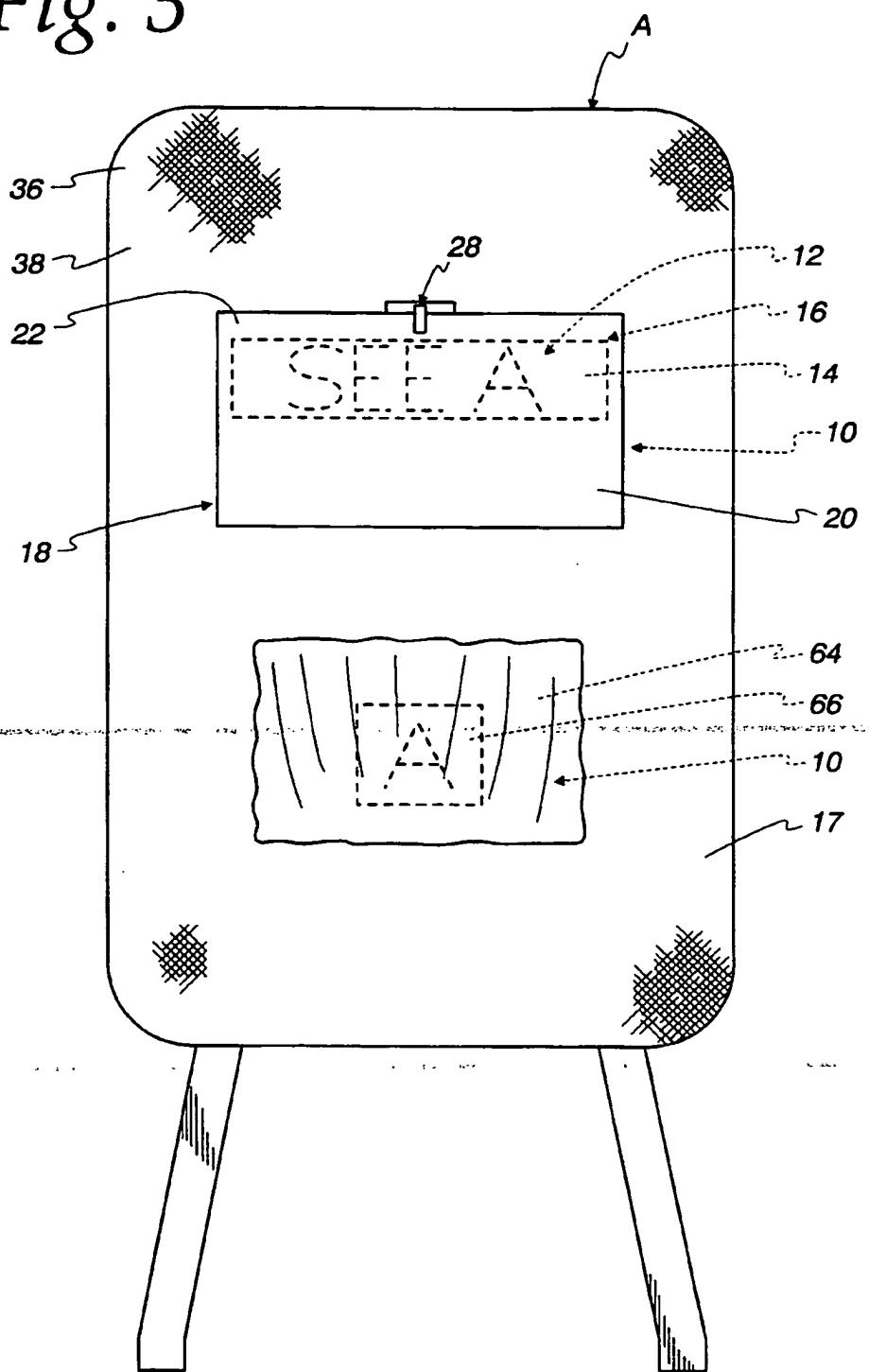
Fig. 2



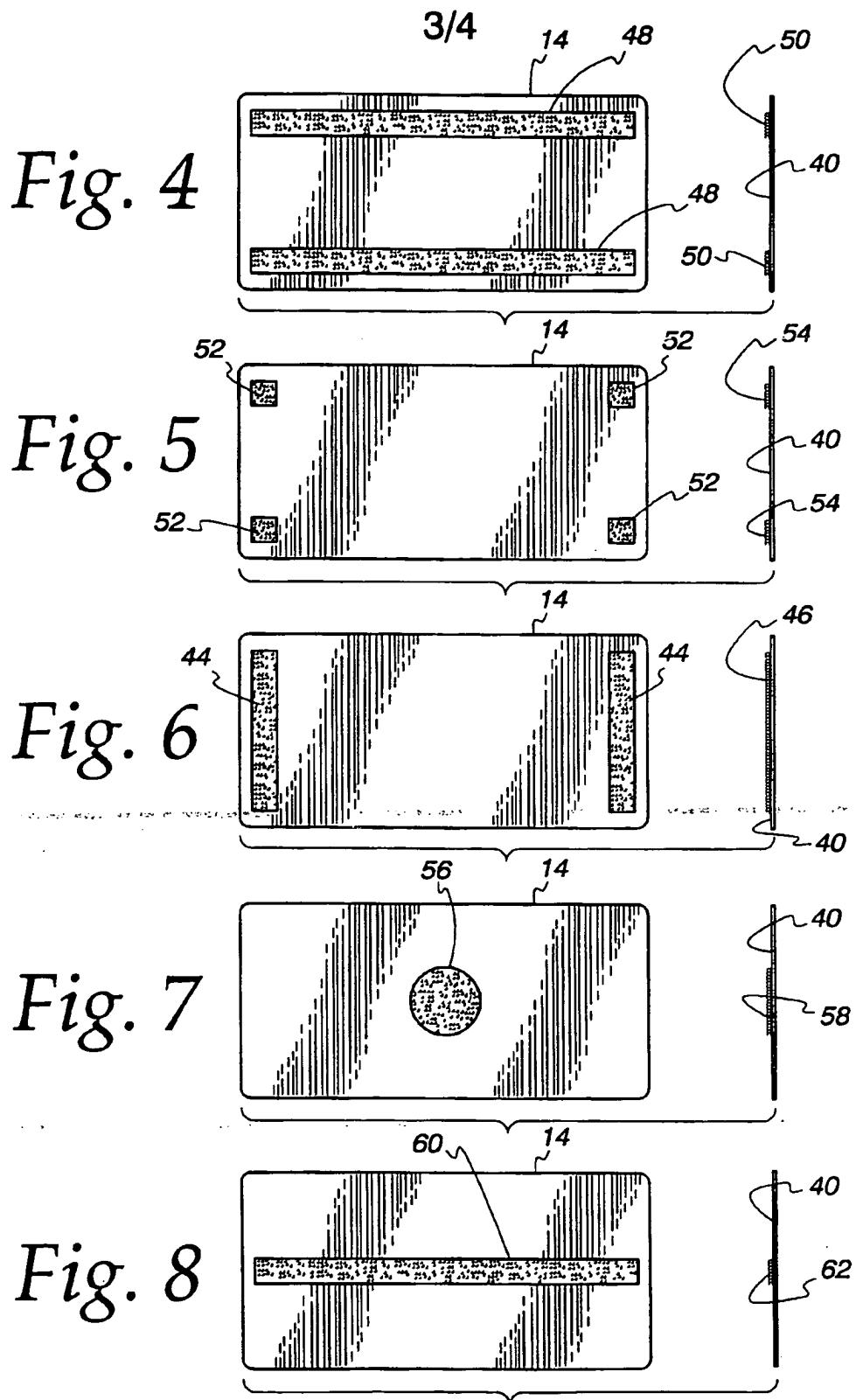
SUBSTITUTE SHEET (RULE 28)

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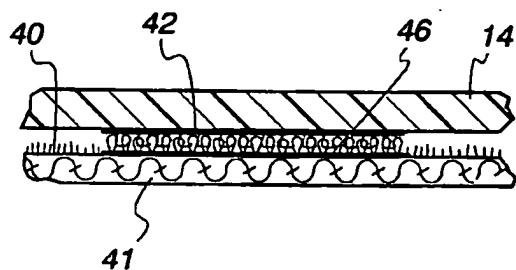
Fig. 3



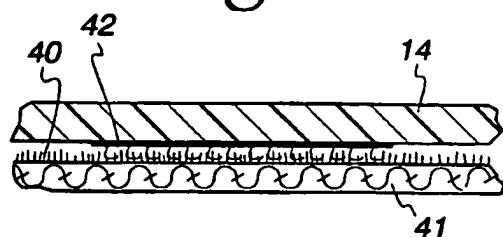
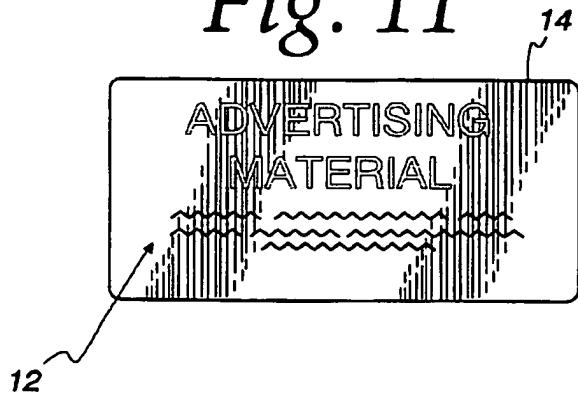
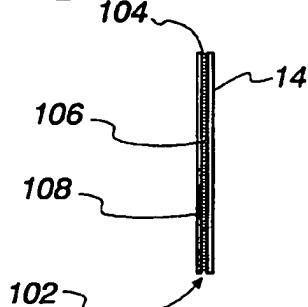
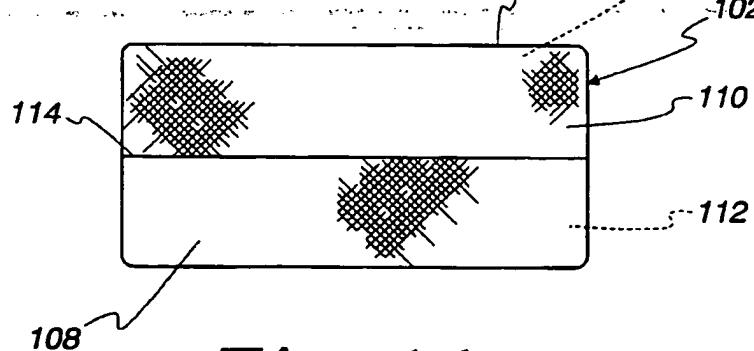
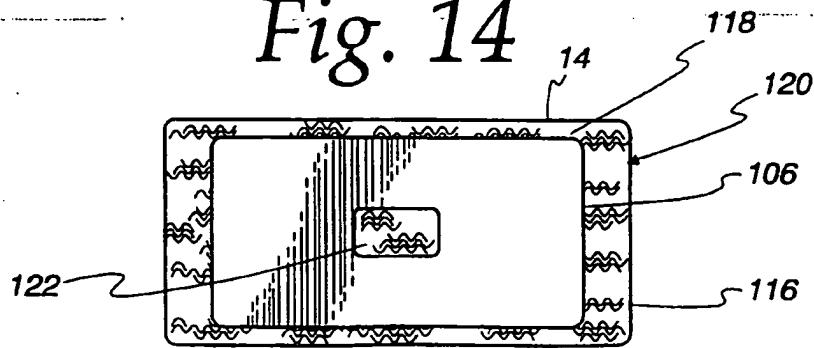
SUBSTITUTE SHEET (RULE 26)



SUBSTITUTE SHEET (RULE 26)

Fig. 9

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Fig. 10*Fig. 11**Fig. 12**Fig. 13**Fig. 14***SUBSTITUTE SHEET (RULE 26)**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/27297

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A47C 7/62
US CL :40/320, 591, 592, 594; 108/ 44, 134

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 40/320, 591, 592, 594; 108/ 44, 134

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,720,515 A (HAFFNER) 24 FEBRUARY 1998 (24.02.98) SEE FIGURES 2, 7, 9, AND 10	1-19
X	US 5,555,458 A (LARGE) 10 SEPTEMBER 1996 (10.09.96) SEE FIGURES 2 AND 4	1-19
A	US 4,999,937 A (BECHTOLD) 19 MARCH 1991 (19.03.91) SEE FIGURE 1 AND COL. 1, LINES 65-68 AND COL. 2, LINES 1-5.	1-19

<input type="checkbox"/>	Further documents are listed in the continuation of Box C.	<input type="checkbox"/>	See patent family annex.
* "A"	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"B"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"A"	document referring to an oral disclosure, use, exhibition or other means
"P"	document referring to an oral disclosure, use, exhibition or other means		document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search	Date of mailing of the international search report
14 MARCH 1999	14 APR 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Deanne Borlunge</i> CASSANDRA DAVIS Telephone No. (703) 308-2168

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